

**Remarks**

Examiner Pham is thanked for the thorough Office Action.

**In the Claims**

Independent claims 24 and 46 have each been amended to delete "coextensive" before "upper solder material portion" at line 7 and 5, respectively. These amendments were noted in Applicant's submission filed on 10/10/2006 but not actually executed in the claims. These amendments do not narrow the scope of the claims.

Independent claims 1, 24 and 46 have each been amended to add the limitation that the die comprises at least two different types of pillar structures. Dependent claims 2 to 8, 11, 12, 24 to 30, 33, 34, 47 to 53, 56 and 57 have been amended to correspond to these amendments.

Independent claims 1, 24 and 46 have each been amended to add the phrase "over and in substantial contact with only an upper surface of the lower high-melting point non-solder portion" after "the one or more pillar structures are bi-layer having a lower high-melting-point non-solder portion and an upper solder material portion". This phrase does not narrow the scope of the claims as it only makes explicit

what was implicit, i.e. that the upper solder material portion is over (and not surrounding as is disclosed and shown in Kondoh, Fig. 19, for example) the lower high-melting-point non-solder portion.

Dependent claims 21, 22, 43, 44, 66 and 67 have each been amended at line two replacing “having” with -- each have --. These amendments are not believed to have narrowed the scope of these claims.

No new matter has believed to have been added.

**The Rejection Of Claims 1, 46, 69 And 71 Under 35 U.S.C. §102(b) As Being Anticipated By Kondoh et al. (U.S. Patent No. 5,448,114)**

The rejection of claims 1, 46, 69 and 71 under 35 U.S.C. §102(b) as anticipated by Kondoh et al. (U.S. Patent No. 5,448,114) (the '114 Kondoh Patent) is acknowledged.

**The Rejection Of Claims 2, 9, 11 To 13, 19, 24, 31, 33 To 35, 41, 47, 54, 56 To 58, 64 And 70 Under 35 U.S.C. §103(a) as Being Unpatentable Over Kondoh et al. (U.S. Patent No. 5,448,114) As Applied To Claims 1, 46, 69 And 71 Above, And Further In View Of The Following Reasons.**

The rejection of claims 2, 9, 11 to 13, 19, 24, 31, 33 to 35, 41, 47, 54, 56 to 58, 64 and 70 under 35 U.S.C. §103(a) as being unpatentable over Kondoh et al. (U.S. Patent No. 5,448,114) (the '114 Kondoh Patent) as applied to claims 1, 49, 69 and 71 above, and further in view of the following reasons is acknowledged.

**The Rejection Of Claims 3 To 8, 10, 16, 20 To 23, 25 To 30, 32, 38, 42 To 45, 48 To 53, 55, 61 And 65 To 68 Under 35 U.S.C. §103(a) as Being Unpatentable Over Kondoh et al. (U.S. Patent No. 5,448,114) As Applied To Claims 1, 2, 9, 11 To 13, 19, 24, 31, 33 To 35, 41, 46, 47, 54, 56 To 58, 64 And 69 To 71 Above, And Further In View Of Lee et al. (U.S. Patent No. 6,642,136 B1 And The Following Reasons.**

The rejection of claims 3 to 8, 10, 16, 20 to 23, 25 to 30, 32, 38, 42 to 45, 48 to 53, 55, 61 and 65 To 68 under 35 U.S.C. §103(a) as being unpatentable over Kondoh et al. (U.S. Patent No. 5,448,114) (the '114 Kondoh Patent) as applied to claims 1, 2, 9, 11 to 13, 19, 24, 31, 33 to 35, 41, 46, 47, 54, 56 to 58, 64 and 69 to 71 above, and further in view of Lee et al. (U.S. Patent No. 6,642,136 B1 (the '136 Lee Patent) and the following reasons is acknowledged.

Applicants' wish to briefly point up the claimed features of their invention which are believed to be not shown nor obvious from the teachings of known references in this field. The claims (including independent claims 26 and 46) (using independent claim 1 as a template) all clearly define a die comprising: (1) a substrate; and (2) ~~one~~ two or more different types of pillar structures formed over the substrate in a pattern; at least one of the ~~one~~ two or more different types of pillar structures are bi-layer having a lower high-melting-point non-solder portion and an upper solder material portion over and in substantial contact with only an upper surface of the lower high-melting point non-solder portion; wherein the lower high-melting-point non-solder portion does not melt during a reflow process to form the ~~one~~ two or more different types of pillar structures.

Claims 1, 46, 69 and 71 have been rejected under §102(b) as being anticipated by Kondoh.

According to the section 2131 of the MPEP “A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.” Verdegaal Bros. vs. Union Oil Co. of California, 814 F. 2d 628, 631 2 USPQ2d 1051, 1053 (Fed. Cir. 1987).

However the ‘114 Kondoh Patent does not disclose “two or more different types of pillar structures” and that “at least one of the two or more different types of pillar structures are bi-layer having a lower high-melting-point non-solder portion and an upper solder material...”. Thus, none of claims 1, 46, 69 and 71 are anticipated by Kondoh under §102(b).

Applicant further still respectfully maintains its previous argument in that although the ‘114 Kondoh Patent discloses a wall member 3 and bump 4, they are not the “pillar structure” as defined in the instant specification. As disclosed by Kondoh the wall member 3 and the bump 4 are each made of solder (“a wall member 3 made of solder”, Col. 9, line 10; and “when a solder bump 4 is reflowed naturally”, Col. 10, line 59). Therefore both wall member 3 and bump 4 will melt and reflow in the “reflow process to form the one or more pillar structures” (e.g., independent claim 1, line 7 of the instantly claimed invention).

**Yet further**, the claim language “a *lower* high-melting-point non-solder portion and an *upper* solder material portion” (emphasis added) does not read on the *final* Kondoh structure of Fig. 19, for example. That is, Fig. 19 of Kondoh shows solder layer 45 *surrounding* the top and sides of core layer 44 and thus solder layer 45 is not an upper portion and core layer 44 is not a lower portion. *Regardless*, Applicant has added the phrase “over and in substantial contact with only an upper surface of the lower high-melting point non-solder portion” after “the one or more pillar structures are bi-layer having a lower high-melting-point non-solder portion and an upper solder material portion” to make explicit what was implicit.

**Clearly**, Kondoh does not disclose, inter alia, “one or more pillar structures formed over the substrate in a pattern; at least one of the one or more pillar structures are bi-layer having a lower high-melting-point non-solder portion and an upper solder material portion over and in substantial contact with only an upper surface of the lower high-melting point non-solder portion;” Claim 1, lines 1 to 5.

Comparatively, in the instantly claimed invention (see, for example, claim 1, lines 3 to 7), the claimed “lower high-melting-point non-solder portion” is not solder and will not reflow in the process (“wherein the lower high-melting-point non-solder portion does not melt during a reflow process to form the one or more pillar structures”). This above quoted language of instant claim 1, 46, 69 and 71 therefore

distinguishes over Kondoh under §102(b) as Kondoh does not disclose a non-solder *lower* portion that does not melt during a reflow process to form the one or more pillar structures wherein the one or more pillar structures are bi-layer having a lower high-melting-point non-solder portion and an upper solder material portion over and in substantial contact with only an upper surface of the lower high-melting point non-solder portion.

§103 Rejections – Overview Analysis

According to the MPEP section 2142 regarding §103, “The examiner bears the initial burden of factually supporting any prima facie conclusion of obviousness...”. Further,

To establish a prima facie case of obviousness, three basis criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on the applicant’s disclosure.

However, neither Kondoh alone, nor Kondoh as applied to claims 1, 2, 9, 11 to 13, 19, 24, 31, 33 to 35, 41, 46, 47, 54, 56 to 58, 64 and 69 to 71 and further in view of Lee, disclose or fairly teach, alone or in the combination noted by the Examiner, inter alia, the claimed limitations “two or more different types of pillar structures” and that “at least one of the two or more different types of pillar structures are bi-layer having a lower high-melting-point non-solder portion and an upper solder material...”. Thus claims 2, 9, 11 to 13, 19, 24, 31, 33 to 35, 41, 47, 54, 56 to 58, 64 and 70 are not obvious over Kondoh under §103(a) and claims 3 to 8, 10, 16, 20 to 23, 25 to 30, 32, 38, 42 to 45, 48 to 53, 55, 61 and 65 To 68 are not obvious over Kondoh as applied to claims 1, 2, 9, 11 to 13, 19, 24, 31, 33 to 35, 41, 46, 47, 54, 56 to 58, 64 and 69 to 71 and further in view of Lee under §103(a).



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Further:

I. Claims 2, 9, 11 to 13, 19, 24, 31, 33 to 35, 41, 47, 54, 56 to 58, 64 and 70  
have been rejected under §103(a) as being unpatentable over Kondoh as applied to  
claims 1, 49, 69 and 71.

The above analysis under the 102(b) rejection over Kondoh also applies for this 103(a) rejection (as inter alia, as noted above, independent claim 24 has been amended to include the noted claim language) and thus claims 2, 9, 11 to 13, 19, 24, 31, 33 to 35, 41, 47, 54, 56 to 58, 64 and 70 further distinguish over Kondoh under §103(a) as, inter alia: (1) there is no teaching or suggestion to modify Kondoh in a manner to meet these claims; (2) Kondoh is an inoperative reference as to the instantly claimed invention vis a vis having a *lower* portion that does not “melt during a reflow process to form the one or more pillar structures wherein the one or more pillar structures are bi-layer having a lower high-melting-point non-solder portion and an upper solder material portion over and in substantial contact with only an upper surface of the lower high-melting point non-solder portion”; and (3) the Examiner has not presented a convincing line of reasoning as to why the claimed subject matter as a whole, including its differences over the prior art, would have been obvious (see the above analysis and the initial overview analysis).

II. Claims 3 to 8, 10, 16, 20 to 23, 25 to 30, 32, 38, 42 to 45, 48 to 53, 55, 61 and 65 To 68 have been rejected under §103(a) as being unpatentable over Kondoh as applied to claims 1, 2, 9, 11 to 13, 19, 24, 31, 33 to 35, 41, 46, 47, 54, 56 to 58, 64 and 69 to 71 and further in view of the '136 Lee Patent.

Again, the above analysis under the 102(b) rejection over Kondoh also applies for this 103(a) rejection as well as the analysis under the first 103(a) rejection over Kondoh as does the initial overview analysis.

Therefore claims 1 to 13, 16, 19 to 35, 38, 41 to 58, 61 and 64 to 71 are submitted to be allowable over the cited references and reconsideration and allowance are respectfully solicited.

### CONCLUSION

In conclusion, reconsideration and withdrawal of the rejections are respectively requested. Allowance of all claims is requested. Issuance of the application is requested.

It is requested that the Examiner telephone Stephen G. Stanton, Esq. (#35,690) at (610) 296 - 5194 or the undersigned attorney at (845) 452 - 5863 if the

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Examiner has any questions or issues that may be resolved to expedite prosecution and place this Application in condition for Allowance.

Respectively submitted,

A handwritten signature in black ink, appearing to read 'SBA', is written above a horizontal line.

Stephen B. Ackerman  
Reg. No. 37,761